ASSESSMENT OF NUTRIENT TRENDS AND LOADS FOR THE MOBILE RIVER BASIN

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Abstract. U.S.Geological Survey (USGS) surface-water sampling sites in the Mobile River Basin were reviewed for available nutrient data for the period 1970-97. Sites having sufficient nutrient data were evaluated for long-term trends in nutrient concentrations and nutrient transport was calculated for selected basins. The effort was undertaken as part of the National Water-Quality Assessment Program.

USGS sampling sites having periods of continuous streamflow and nutrient data were examined from the period 1970-97 for long-term trends with the Seasonal Kendall trend test. Trends and loads were estimated for total nitrogen at 15 sites and for total phosphorus at 14 sites. The Seasonal Kendall trend test adjusts for seasonal variability using nutrient concentrations adjusted for the effects of streamflow with residuals from LOWESS (**LO**cally **W**eighted **S**um of **S**quares) smoothed curves. Trends also were determined for sites without continuous data using multivariate regression analysis.

The Alabama River at Claiborne, Ala., and Tombigbee River at Coffeeville, Ala., sites were used to represent the most downstream locations in the Mobile River Basin. The trends identified included decreasing concentrations of total nitrogen which suggest that there has been an overall reduction in the nitrogen contributions to Mobile Bay from the Mobile River from the mid-1970s to the present. Total nitrogen concentrations have also decreased (1980-95) in the Black Warrior River, one of the major tributaries to the Tombigbee River. Total phosphorus concentrations have increased from 1970 to 1996 at three stations on the Etowah River in Georgia.

Total nitrogen and total phosphorous loads were calculated using multivariate linear regression with bias correction by a minimum variance unbiased estimation method (Cohn and others, 1989). Total nitrogen loads were estimated for the the Tombigbee River at Coffeeville, Ala. (66.2 tons per day average for 1988-96); and Alabama River at Claiborne, Ala. (59.5 tons/day). The yield for the Tombigbee River site (1.31 tons/mi^2/yr), which drains a greater percentage of agricultural (row crop) land use, was greater than that of the Alabama River site (0.99 ton/mi^2/yr).

Two headwater tributaries to the Tombigbee River had the highest estimated total nitrogen yields of the 15 sites evaluated: Tibbee Creek (2.61 tons/mi^2/year) and Luxapallila Creek (2.17 tons/mi^2/year). Other sites having nitrogen yields higher than 1.75 tons/mi^2/yr included the Cahaba River (1.98 tons/mi^2/yr), and the Little Cahaba River (1.85 tons/mi^2/yr), both located in the Alabama River Basin.

Total phosphorous loads in the Tombigbee River at Coffeeville were estimated at 8.8 tons/day (mean 1988-96) and 6.5 tons/day for the Alabama River at Claiborne. The yield for the Tombigbee River at Coffeeville (0.175 ton/mi^2/yr) was greater than that of the Alabama River at Clairborne (0.108 ton/mi^2/yr). The phosphorus yield for the Tombigbee River near Fulton, Miss. (0.164 ton/mi^2/year) in the headwaters of the basin was similar to that estimated at the most downstream station at Coffeeville, indicating little variation in nutrient concentration from the subbasin. The highest phosphorus yield was estimated for the Noxubee River (0.265 ton/mi^2/yr) located in an agricultural area of the Tombigbee Basin. Tibbee Creek, another headwater tributary in an agricultural area of the Tombigbee River, indicated a total phosphorus yield of 0.222 ton/mi^2/yr. Other yields higher than 0.16 tons/mi^2/yr were estimated for the Etowah River at Canton, Ga. (0.188 ton/mi^2/year), the Etowah River at Rome, Ga. (0.163 ton/mi^2/yr), and the Coosa River near Rome, Ga. (0.241 ton/mi^2/year). These three rivers drain developed areas around Rome, Ga., and flow into Weiss Lake in Alabama—an impoundment of the Coosa River. Weiss Lake has been classified as eutrophic (Alabama Department of Environmental Management, 1996).

LITERATURE CITED

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